



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/955,432	09/19/2001	Tatsuya Maruo	0171-0784P-SP	9441

2292 7590 11/30/2004

BIRCH STEWART KOLASCH & BIRCH  
PO BOX 747  
FALLS CHURCH, VA 22040-0747

EXAMINER

CHANEY, CAROL DIANE

ART UNIT	PAPER NUMBER
----------	--------------

1745

DATE MAILED: 11/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/955,432

**Applicant(s)**

MARUO ET AL. .

**Examiner**

Carol Chaney

**Art Unit**

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11,453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 13-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 18-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 11-17-03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

***Summary***

Claims 7-22 are pending. Applicants' amendment filed 04 June 2004 is proper and is entered.

Claims 13-17 have been withdrawn from consideration as being drawn to nonelected subject matter.

Claims 7-12 and 18-21 are rejected for essentially reasons of record over Venugopal et al., US Patent 5,558,959.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Venugopal et al., US Patent 5,558,959 in view of Katsurao et al., US patent 6,372,388.

***Claim Rejections - 35 USC § 103***

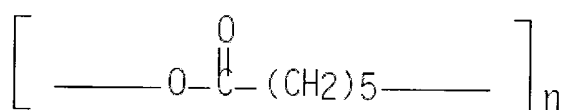
The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 7-12, 18, 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Venugopal et al., US Patent 5,558,959 for essentially reasons of record.

Venugopal et al. disclose polyurethane gel electrolyte systems. The electrolyte system includes an organic support structure and a liquid electrolyte absorbed by the organic support structure, (column 3, line 10) and is disposed between the anode and the cathode. (See Fig. 1). The electrolyte is therefore used as a separator. The organic support structure may be a segmented block copolymer. An example on an

Art Unit: 1745

inventive block copolymer is a polyurethane thermoplastic which is a copolymer of a short-chain diisocyanate and a polyester diol. (Column 3, lines 8-44.) An example of polyester diol usable in the invention is polycaprolactone, which corresponds to applicants' formula (1). (See Venugopal et al., column 4, lines 18-29 and Chemical Abstracts RN 25248-42-4.)



The polyurethane/liquid electrolyte system disclosed by Venugopal et al. may be mixed with cathode powders to form composite cathodes. (See column 6, lines 51-63.) Since the liquid electrolyte has been absorbed by the polyurethane support structure, cathode powder is effectively mixed with a gel material containing a polyurethane polymer and a liquid electrolyte. The mixture of cathode powder and electrolyte gel forms a "composite cathode", and in such situations the polymer electrolyte can act as the active material binder. As evidence, see the discussion by Lamanna et al., US Patent 5,652,072, column 6, lines 47-61.)

In a preferred embodiment, a film containing 0.5 grams of polyester/polyurethane resin, and 2.0 g of a 1M solution of electrolyte described. (See column 7, Example I.) Thus, a solution containing 20 wt% resin is described.

In a preferred embodiment, Venugopal et al. disclose forming a polyurethane film by compression molding, and subsequently soaking the film in a 1 M solution of lithium

Art Unit: 1745

tetrafluoroborate dissolved in propylene carbonate. This process clearly swells the polyurethane film. (See column 8, lines 15-26.)

The disclosure of Venugopal et al. differs from applicants' invention in that Venugopal et al. do not recite a specific amount of swelling which occurs after 24 hours. Venugopal et al. describe the swelling occurring after soaking a specific embodiment for 48 hours instead. Venugopal et al. describe an inventive polyurethane film soaked for 48 hours to contain about 63% liquid electrolyte. (Column 8, lines 20-22.) Therefore, 37% of the soaked film is polyurethane, and is the original weight of the film. The swelling ratio after 48 hours is  $100/37 \times 100$  or about 270%.

Venugopal et al. note that with increasing wt% of the liquid electrolyte material [in the gel electrolyte] the conductivity similarly increases. Thus, the swelling ratio of polyurethane film is a result effective variable, and it would be within the skill of the ordinary artisan to adjust the amount of swelling of the polyurethane film which occurs in 24 hours in order to adjust conductivity of the film.

With regards to claims 18 and 19, Venugopal describe an electrolyte system using a block copolymer containing polycaprolactone, which corresponds to applicants' formula (1) with the exception that the number of repeating units in the polymer segment are not mentioned.. (See Venugopal et al., column 4, lines 18-29.) However, Venugopal suggest polyester diol segments with relatively high molecular weights should be used. (Column 4, lines 10-14.) One of ordinary skill in the art would interpret this teaching to include polymer segments with more than 5 repeating units.

With regards to claim 21, the polyurethane materials described by Venugopal et al. are synthetic rubbers. As evidence, see <http://www.psrc.usm.edu/macrog/pb.htm>

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Venugopal et al., US Patent 5,558,959 in view of Katsurao et al., US patent 6,372,388.

As discussed above, Venugopal et al. disclose applicants' invention essentially as claimed, with the exception that Venugopal et al. do not include fluoropolymers as binder thermoplastic resins. Katsurao et al. discloses blending a polyvinylidene fluoride copolymer or a mixture of an polyvinylidene fluoride and another resin with an organic solvent and a powdery electrode material to form an electrode. (See column 6, line 60-column 7, line 4.) The polyvinylidene fluoride is thus a binder material. The vinylidene fluoride material is taught to improve the retentivity of powdery electrode materials, the ionic conductivity and the heat resistance in polymer batteries. (See column 16, lines 35-47.) Thus, it would have been obvious to one of ordinary skill in the art to include the polyvinylidene fluoride material taught by Katsurao et al. in order to improve the retentivity of powdery electrode materials, the ionic conductivity and the heat resistance in polymer batteries taught by Venugopal et al.

### ***Response to Arguments***

Applicant's arguments filed 04 June 2004 have been fully considered but they are not persuasive.

Applicants assert Venugopal et al. may teach that the polyurethane/liquid electrolyte system is usable for a binder resin for an electrode composition, but fail to teach or suggest that the polyurethane acts as a binder in the polyurethane/liquid electrolyte system. However, the polyurethane/liquid electrolyte system disclosed by Venugopal et al. includes an organic support structure (the polyurethane block copolymer) and a liquid electrolyte absorbed by the organic support structure. (See column 3, line 10) The polyurethane/liquid electrolyte system, which includes the thermoplastic polyurethane resin, acts as a binder. Thus, the polyurethane acts, in conjunction with the absorbed electrolyte solution, as binder. As evidence, J.R. Owen, in "Composite Electrodes", Solid State Ionics, 5, (1981) 343-346, notes "The term 'composite electrode' is used here to describe an agglomeration of small grains of an insertion electrode material *bound together by another phase, usually but not necessarily a soft solid electrolyte.*" (emphasis added.) Thus, in composite electrodes, the binder is often the electrolyte. The gel electrolyte system Venugopal et al. describe as mixed with cathode powder to form a composite cathode is both electrolyte and binder.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carol Chaney whose telephone number is (571) 272-1284. The examiner can normally be reached on Mon - Fri 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



Art Unit: 1745

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Carol Chaney  
Primary Examiner  
Art Unit 1745

29 November 2004